Lesson 1

Read Chapter 1 and Chapter 2

Units

Formulas

Constant rate of change

Coordinate systems

Distance formula

Linear motion

- web page : https://sites.math.washington.edu/ep2/classes/120/120.html
- Math Department page for 120 (math 120 materials website): https://sites.math.washington.edu/ $\sim$ m120/
- email : ep2@uw.edu
- announcements
- syllabus
- Exam dates
- WebAssign
- Lectures before /after
- Worksheet

Word Problems

- Draw a picture (Ch 2)
- Identify useful formulas
- Pay attention to units, variables

Check handouts with Area and Volume formulas

Other formulas :

rate at which position changes

$\boxed{d = vt}$, for constant velocity v

change in position

$\boxed{\text{mass= density x volume}}$

$\boxed{\text{total change} = \text{rate of change x t}}$, for constant rate of change

Convert 7857.31 sec into hours, min, sec

$\frac{7857.31}{3600} = 2.1826$ hr

2 hr and 0.1826 ~~hr~~ $\cdot 60$ min $= 10.956$ min

10 min and $.956$ ~~min~~ $\cdot 60$ sec $= 57.36$ sec

2 hr 10 min 57 sec convert back :

$2 + 10 \cdot \frac{1}{60} + 57 \cdot \frac{1}{3600} = 2.1825$

Error tolerance in WebAssign

at a constant speed

Sarah can bicycle around a path in two hours and 40 min. If she decreases her speed by 1 km/hr her time increases by 4 min. How long is the path ?

$d = v \cdot t$

$d = v \cdot 160$

$d = (v - \frac{1 \text{ km}}{60 \text{ min}}) \cdot 164$

want to find d

$160 \cdot v = 164\left(v - \frac{1}{60}\right) = 164v - \frac{164}{60}$

$\frac{164}{60} = 164v - 160v = 4v$ $\qquad \frac{164}{60 \cdot 4} = v \simeq 0.6833$ km/hr

$d = 0.6833 \cdot 160 = 109.33$ km

Dave has inherited an apple orchard with 60 trees. Each tree yields 12 bushels of apples. For each tree that is removed the yield per tree goes up 0.45 bushels. Find a formula for a function $f(x)$ that gives the total yield of the orchard (NOT the yield per tree) in terms of the number x of trees remaining in the orchard.

# trees x	f(x)
60	$12 \cdot 60$
59	$(12 + 1 \cdot 0.45) \cdot 59$
58	$(12 + 2 \cdot 0.45) \cdot 58$
57	$(12 + 3 \cdot 0.45) \cdot 57$
X	$(12 + \underbrace{y}_{\#\text{ trees removed}} \cdot 0.45) \cdot x$

$\#$ trees left

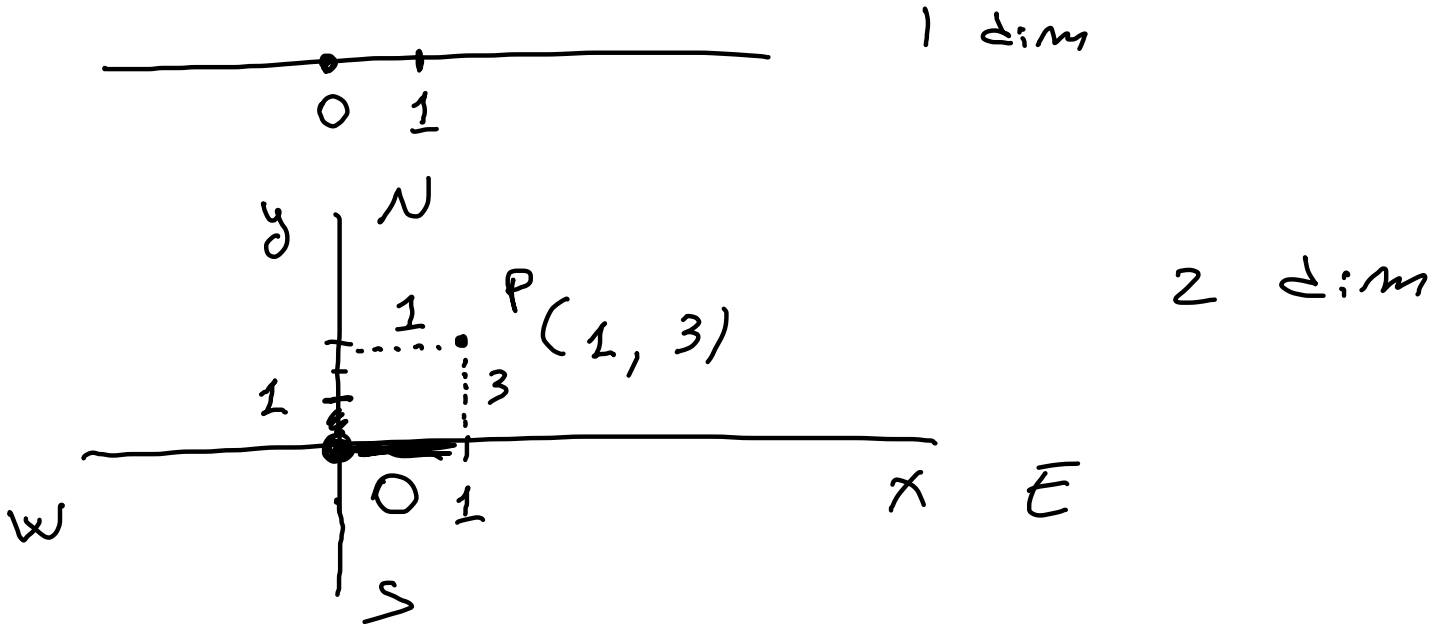
$x + y = 60 \qquad y = 60 - x$

$f(x) = (12 + (60-x) \cdot 0.45) \cdot x$

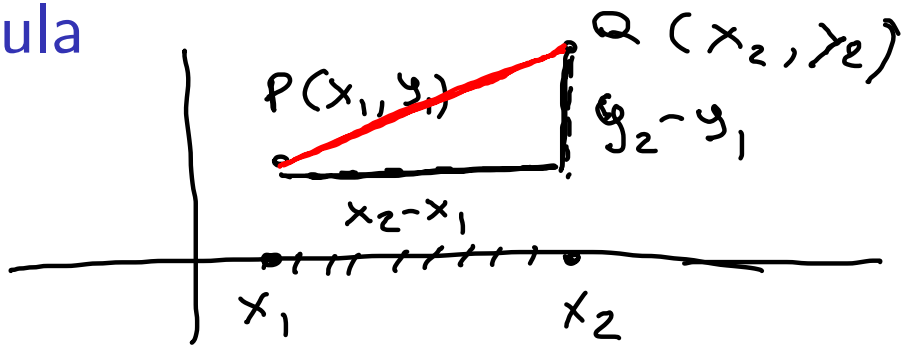
In hw $N =$ "formula"

In order to set up a coordinate system you need:

- Origin
- Axes
- Units on axes



Distance formula



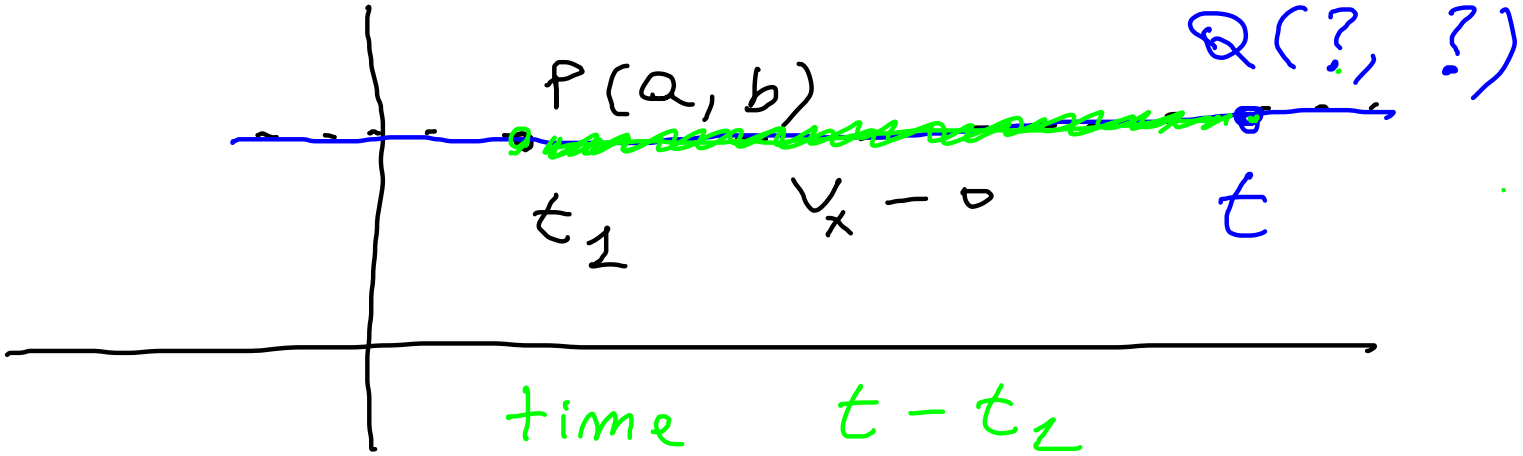
The distance between $P(x_1, y_1)$ and $Q(x_2, y_2)$ is

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\| \quad \| \quad \|$$

$$\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

Note: $\sqrt{a^2+b^2} \neq \sqrt{a^2} + \sqrt{b^2}$ WRONG



Suppose at time t_1 an object starts moving from $P(a, b)$ with velocity v_x along an horizontal line; its x coordinate at time t is

$$x = a + v_x(t - t_1)$$

v — time object has travelled from P to Q

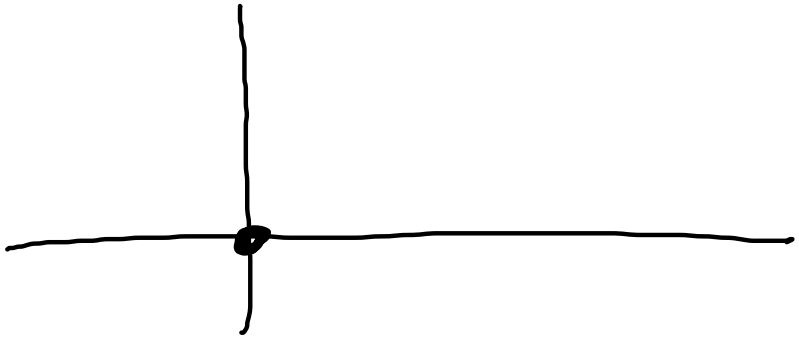
$y = b$ d

Suppose at time t_1 an object starts moving from $P(a, b)$ with velocity v_y along a vertical line; its y coordinate at time t is

$x = a$

$$y = b + v_y(t - t_1)$$

Ann and Bob start moving at the same time from the same location. Ann moves East at 6 feet/sec. Bob moves North at 5 feet/sec.
What is the distance between Ann and Bob 10 sec later ?
When is the distance between Ann and Bob 50 feet ?



origin : point where Ann and Bob are when they start moving
$t = 0$ when Ann and Bob start moving.